Mr. Michael T. Davis WLPCS Calculus	Section 3.3 Practice Quiz January 2, 2018

Name: Solutions / Answers

1. Find $\frac{dy}{dx}$ for the function $y = x^3 - x^2 + x - 1$

$$\frac{dy}{dx} = 3x^{3-1} - 2x^{2-1} + x^{1-1} - 0 = 3x^2 - 2x + 1$$

2. Find $f'(x)$ for the function $f(x) = \frac{x^3}{3} + \frac{x^2}{2} - x$

$$f'(x) = \frac{3x^2}{3} + \frac{2x}{2} - 1 = x^2 + x - 1$$

3. Find y' for the function $y = 75$

$$y' = 0$$

4. Find $f'(x)$ for the function $f(x) = -x$

$$f'(x) = -1$$

5. Find $\frac{dy}{dx}$ for the function $y = mx + b$

$$\frac{dy}{dx} = m$$

6. Find y' for the function $y = \frac{1}{x} + \frac{1}{x^2} = x^{-1} + x^{-2}$

$$y' = -x^{-1-1} + -2x^{-2-1} = -x^{-2} - 2x^{-3} = \frac{-1}{x^2} - \frac{2}{x^3}$$

7. Find $\frac{dy}{dx}$ for the function $y=\sqrt{x}+\sqrt[3]{x}-100$ $= x^{\frac{1}{2}} + x^{\frac{1}{3}} - 100$

$$\frac{dy}{dx} = \frac{1}{2}x^{\frac{1}{2}-1} + \frac{1}{3}x^{\frac{1}{3}-1} = \frac{1}{2}x^{-\frac{1}{2}} + \frac{1}{3}x^{-2/3} = \frac{1}{2x^{1/2}} + \frac{1}{3x^{2/3}}$$

$$= \frac{1}{2\sqrt{x}} + \frac{1}{3\sqrt[3]{x^2}}$$

8. Find $f'(x)$ for the function $f(x)=x^{-4}-2x^{-5}$

$$f'(x) = -4x^{-5} + 10x^{-6} = \frac{-4}{x^5} + \frac{10}{x^6}$$

9. Find y' for the function $y=\left(3x^2+x\right)\left(2\sqrt{x}-5\right)$

$$y' = (6x+1)(2\sqrt{x}-5) + (3x^2+x)\left(2\cdot\frac{1}{2}x^{-\frac{1}{2}}\right)$$

10. Find $\frac{dy}{dx}$ for the function $y=\frac{3x^2-4}{\sqrt{x}}$

$$\frac{dy}{dx} = \frac{(6x)(\sqrt{x}) - (3x^2-4)\left(\frac{1}{2}x^{-\frac{1}{2}}\right)}{(\sqrt{x})^2}$$

11. Find $f'(x)$ for the function $f(x)=(x-1)^4(x+5)^3$

$$f'(x) = 4(x-1)^3(x+5)^3 + (x-1)^4(3)(x+5)^2$$

12. Write an equation for the line normal to the graph of $f(x)=\dfrac{(x-1)^3}{(x+2)^2}$ at $x=-1$

$$f'(x)=\frac{3(x-1)(x+2)^2-(x-1)^3(2)(x+2)}{(x+2)^4}$$

13. Suppose that $u(x)$ and $v(x)$ are functions that are differentiable at $x=1$ and that $u(1)=5$, $u'(1)=-3$, $v(1)=-1$, and $v'(1)=2$. Find the values of the following derivatives at $x=1$.

a. $\dfrac{d}{dx}(uv) = u'v+uv' = u'(x)v(x)+u(x)v'(x)$

at $x=1$ $\dfrac{d(uv)}{dx} = u'(1)v(1)+u(1)v'(1)$

$= (-3)(-1)+(5)(2)$

$= 13$

b. $\dfrac{d}{dx}\left(\dfrac{u}{v}\right) = \dfrac{u'v-uv'}{v^2} = \dfrac{u'(x)v(x)-u(x)v'(x)}{(v(x))^2}$

at $x=1$ $\dfrac{d}{dx}\left(\dfrac{u}{v}\right) = \dfrac{u'(1)v(1)-u(1)v'(1)}{(v(1))^2} = \dfrac{(-3)(-1)-(5)(2)}{(-1)^2} = -7$

14. Write an equation for the line tangent to the graph of $f(x)=3x^2-4x+2$ at $x=-1$.

$f(-1) = 3(-1)^2-4(-1)+2 = 3+4+2=9$ $\quad (x,y)=(-1,9)$

$f'(x) = 6x-4$

$f'(-1) = 6(-1)-4=-10$

$m=-10$

Tangent Line Equation

$y-9=-10(x--1)$

$y-9=-10(x+1)$